TITLE

BREAKAWAY CORD SYSTEM FOR ROLL-UP SHADES

Field of Invention

The present invention relates to a child safety device for window blinds, particularly roll-up shades and shades having such child safety devices.

Background of the Invention

In recent years there has been much concern in the window covering industry about child safety. There have been instances involving pleated shades and venetian type blinds in which a child's head and neck have become entangled in a cord loop that is used to raise and lower, or open and close, the blind and the child was strangled. Consequently, the United States Consumer Product Safety Commission has held hearings and proposed regulations that require looped cords in window covering products to be eliminated or require a device that breaks the loop in the event of entanglement or require a device that envelops or restrains the cord in such a way that a child could not become entangled in the loop.

One popular type of window covering is the roll-up shade. This shade has a panel of window covering material attached at its top edge to a headrail. Roll-up shades have looped cords in which the panel of window covering material is captured. Two or more looped cords extend from the headrail down one side of the panel of window covering material, around the bottom edge of the panel and up an opposite side of the panel of window covering material into the headrail. The cords may then pass through a cord lock in the headrail or wind around a cord collector within the headrail. Movement of the cords into the headrail will cause the panel of window covering material to roll-up and movement of the cords out of the headrail will cause the

window covering material to unroll. Although there has never been a reported incident of a child becoming entangled in a roll-up shade, some have observed that the loops in a roll-up shade pose the same danger as cord loops that are used to raise and lower, or open and close, other types of blinds. Consequently, there has been an interest in developing a child safety device for roll-up shades which will prevent a child from becoming entangled in the cord loops that are used to raise and lower the shade material.

Hyman et al. a disclose breakaway cord connection apparatus for roll-up shades in United States Patent No. 6,431,248 and published United States Patent Application No. 2003/0150567 A1. Both references disclose a releasable cord connection apparatus in which the cord is attached to a V-shaped connective member. That connective member is inserted into a recess provided in a receptive member attached to the headrail. When a sufficient force is applied to the cord connected to a connective member, the top of the V-shaped body collapses, allowing the connective member to pass through the recess releasing the connective member and cord from the receptive member. The published application also discloses a breakaway apparatus in which a breakaway end portion on a cord can move along a recessed track and separate from the track when a downward force is applied to the cord. One problem with the breakaway systems disclosed by Hayman et al. is that the cords are always connected to the breakaway apparatus. It is not possible to easily remove the cords from the breakaway apparatus and reattach them to the headrail in a manner so that they will not breakaway. Another problem with this system is that the amount of force that is required to cause the cord to breakaway is determined by the manufacturer and cannot be changed by the user or the installer.

A number of other child safety devices have been proposed for window coverings and have been available in the marketplace. United States Patent No. 5,592,983 to Sartini et al.,

United States Patent No. 5,542,462 to Eisenheimer et al., United States Patent No. 5,494,092 to Georgopoulos and United States Patent No. 4,909,298 to Langhart et al. disclose breakaway child safety tassels. These patents disclose various tassels to which two or more pull cords are attached. The attachment of multiple cords to a single tassel forms cord loops. The child safety tassels are constructed so that when a force acts on the loop, such as will occur when a child becomes entangled in the cords, the tassel breaks apart, separating the cords and breaking the cord loop or loops. The tassel disclosed by Langhart has been made and sold by Hunter Douglas and others in the industry. In tests of this tassel, some tassels subjected to a force did not break apart when they were supposed to do so. Others broke apart under very little force. Both situations are unacceptable and illustrate the difficulty in producing an effective child safety device for window covering products.

The child safety devices that have been proposed for use on window coverings are all designed to be difficult to remove by the end user. Many window coverings are installed in offices and other windows where small children are never present. Indeed, there are many homes in which there are no small children. Many consumers who purchase window coverings for these locations see no need to have child safety devices on the products that they purchase. Indeed, many such customers have asked that the child safety device not be installed in their product. But, manufacturers and installers are often reluctant to do this for fear of liability, either as a result of a child strangulation or for being in violation of a government regulation. Consequently, there is an unsatisfied demand for a child safety device for window coverings that can be removed or deactivated by the purchaser of the blind.

Summary of the Invention

We provide a breakaway cord system for breakaway blinds that can be set by the consumer to release under one of two or more forces, preferably four pounds and ten pounds.

We further provide a breakaway cord system that can be easily adjusted by the consumer or owner of the blind so that the cords will not breakaway from the headrail.

We prefer to provide a U-shaped clip to which a lift cord is permanently attached. In a present preferred embodiment the U-shaped clip can be attached to one of three sections of a safety rail. The safety rail is permanently attached to the headrail of the shade. The first two sections of the safety rail are flat and have a bead along the lower edge. The clip fits over the bead and, depending upon the bead size in the selected section, will release upon application of a predetermined force, such as four pounds or ten pounds. The third section has a scored portion that can be removed to create a hole through which the U-shaped clip can be fitted so that the cord will not breakaway from the safety rail. In order to connect the clip to the third portion of the safety rail, the user must punch out the second portion of the rail to provide an opening through which the clip is inserted.

In another present preferred embodiment, the safety rail has two sections. The first section is flat and has a bead along the lower edged. The second section has a cut-out. The clip can be releasably attached to the first section or fitted into the hole formed by removal of the cut-out so that the cord will not breakaway from the headrail.

We also provide a roll-up shade in which the breakaway cord system is provided for each of the looped cords that raise and lower the window covering material. One embodiment has a breakaway cord section that contains a single bead over which the U-shaped clip is fitted.

Other objects and advantages of the present invention will become apparent from a description of the present preferred embodiments shown in the drawings.

Brief Description of the Figures

Figure 1 is a front view of a roll-up shade of the type known in the art.

Figure 2 is a perspective view of a portion of the roll-up shade shown in Figure 1 viewed along the line II-II in Figure 1.

Figure 3 is rear view of a first present preferred embodiment of our roll-up shade with a breakaway cord system having a coupling member or clip and a receptive member or rail.

Figure 4 is a fragmentary view of a portion of the headrail in the embodiment shown in Figure 3 showing the clip attached to the rail in a manner to separate when a selected force acts on a cord attached to the clip.

Figure 5 is a sectional view taken along the line V-V in Figure 4.

Figure 6 is an end view of the clip used in the embodiment of Figures 3 and 4.

Figure 7 is a fragmentary view similar to Figure 4 showing the clip attached to the rail in a manner to prevent breakaway.

Description of the Preferred Embodiments

A typical roll-up shade is shown in Figures 1 and 2. That roll-up shade 1 has a headrail 2 from which window covering material 3 extends. The bottom edge of the window covering material 3 typically has a bottomrail or rod 4 about which the window covering material can be rolled and unrolled. Two or more looped cords 5 and 6 are provided to raise and lower the shade. Each looped cord has one end attached to the headrail. The cord runs down the back

surface of the window covering material around the bottom edge and loops back into the headrail. Typically the cords will pass through a cord lock and exit the headrail as shown in Figure 1. An operator can raise or lower the shade by pulling or releasing the lift cords 5 and 6. Pulling the lift cords causes the window covering material to roll up about a rod 4. Alternatively, the looped cords could be collected on a cord collector within the headrail rather than pass through a cord lock or pulleys. The window covering material may be fabric, woven wood, woven grasses or plastic straws.

In a standard roll-up shade the looped cords 5, 6 can be pulled away from the window covering material as shown in dotted line in Figure 2. Should a child pull an outermost looped cord away from the window covering material, the child could then become entangled in this free loop.

We provide a cord release or breakaway system 12 for roll-up shades 10 which will release one end of the looped cords when a selected force acts on the loop as may occur when a child becomes entangled in the cord. As shown in Figures 3 through 7, the breakaway system 12 has two basic components, a receptive member and a coupling member. In the embodiment shown in Figures 3 through 7 the coupling member is a U-shaped clip 13 to which a lift cord 5, 6 is permanently attached. The lift cord 5, 6 is attached to the clip by passing one end of the cord through the cord channel portion 16 of the clip 13. Then the end of the cord is knotted and captured within the U-shaped body 14. The receptive member is a safety rail or plate 20 which is attached to the headrail 2. In the illustrated embodiment the U-shaped clip 13 can be attached to one of three sections 21, 22 or 23 of the safety rail 20. The safety rail 20 is permanently attached to the headrail 2 of the roll-up shade by an adhesive or by screws 26, shown in Figure 7, passing through holes 25. The first two sections of the safety rail are flat and have a bead 27, 28

along the lower edge. These sections have a planar body portion 19 having a thickness less than the diameter of the bead as shown in Figure 5. We prefer that the bead have a circular cross-section. However, the cross-section could be oval, hexagon, octagon or other polygon with the possible exception of the triangle. A triangular shape would work acceptably on the breakaway, but would be difficult to reattach. We chose the circular cross-section for its relative ease of molding. With the other shapes, the oval excepted, there would be corners on the part, which are subject to increased variation in the mold depending on mold pressure, material impurities, and other factors. This could in turn lead to variation in the separation behavior of the male and female parts. The oval shape should theoretically produce the same results as the circular cross section as long as the clip arms are modified to produce the same relative angle to the bead. The clip 13 fits over the bead 27 or 28 and will separate from the safety rail 20 release upon application of a force upon the coupling member. The amount of force required for separation will depend upon the bead size in the selected section. The third section has a scored portion or punch-out 24 that can be removed to create a hole through which the U-shaped clip 13 can be fitted. The hole created when the punch-out is removed can be larger than the clip 13 or can have a height comparable to the height of the clip 13. If the width of the hole is less than the length of the clip, the clip is inserted end first into the hole and then rotated 90° to the position shown in Figure 7. This clip 13 then rests on the ledge 18 that extends out from section 23. When the U-shaped clip has been fitted through the hole in this way and connected to section 23 of the safety rail 20, the clip and attached cord will not breakaway from the safety rail. In order to connect the clip 13 to the third portion 23 of the safety rail 20, as shown in Figure 7, the user must first remove the punch-out 24 to provide an opening through which the clip is inserted. We prefer that the safety rail 20 never be sold with the punch-out removed. We further prefer that

when the shade is sold the clip be attached to the section 21 which releases under the lowest force.

Both the clip 13 and the rail 20 should be made of the same material, preferably acetal copolymer. They could be made of any one of dozens of other thermoplastics, and possibly metals as well, as long as the geometry of the parts is modified in accordance with the considerations mentioned below to account for the material's mechanical properties and dimensions of the parts.

We have discovered that when the cord connection device is made of acetal copolymer, a circular bead having a diameter of 0.111 inches will release a clip having a configuration shown in Figure 6 when the bottom of the loop formed by the cord in a lowered roll-up shade is pulled downward by a force of four pounds. This clip 13 has a U-shaped body 14 with teeth 15 on the opposite inside surfaces near the ends of the clip. The teeth have a height of 0.0215 inches and are separated by a gap of 0.087 inches. If this same clip is attached to a section which has a circular bead having a diameter of 0.127, the clip will release when ten pounds of force pulls at the bottom of the cord loop.

There are several inter-related material properties and dimensions which determine the breakaway force. These include the flexural modulus of the clip material, tensile yield strength of clip material, coefficient of static friction between the clip and the safety rail, wall thickness of clip arms, length of clip arms, ratio of size of bead cross section to size of clip opening (in its relaxed state), angle formed at bead by clip arm; and overall width of clip (as measured along the length of the bead).

The receptive member or safety rail in the embodiment shown in the drawings has two sections that enable the clip to separate from the receptive member and one section that prevents

breakaway. It should be apparent to those skilled in the art that more or fewer sections could be provided that permit separation. If more than one such section is provided, the separation force required by each section should be different. We prefer to provide a breakaway system in which separation occurs at either four pounds or ten pounds. However, our breakaway system can be configured to provide breakaway at lower or higher forces. Whatever forces are selected, we prefer to label each section, as indicated by letters A, B and C in Figures 4 and 7. The label may be a word, such as "high" or "low," a letter, or a number that may or may not be equal to the breakaway force required to release the clip from that section. Other symbols, pictures or color codes could be used to identify each section.

Our breakaway system is primarily intended for use in roll-up shades. Nevertheless, our system could be used for awnings, tents having roll-up sides, and other products in which a breakaway cord system is desirable.

In the preferred embodiment the receptive member is attached to the headrail and the coupling member is attached to the a lift cord. Those skilled in the art should recognize that this arrangement could be reversed. The coupling member may be attached to the headrail and the receptive member may be connected to a lift cord.

The coupling member in the preferred embodiment has a U-shaped opening and a U-shaped outer configuration. The term U-shaped clip as used here, however, is not limited to that configuration. Rather any structure having a U-shaped opening is encompassed by this term.

Although we have described and illustrated certain present preferred embodiments of our breakaway cord system and roll-up shade having such a system, it should be distinctly understood that our invention is not limited thereto, but may be variously be embodied within the scope of the following claims.